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As bird flu surges in Europe, race is on to stop the spread

With tens of millions of poultry culled every year to contain avian influenza, scientists are rushing to find new ways to protect flocks from infection and avert a human pandemic.

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Bird flu is on the rise throughout the world and the consequences for both migratory birds and domestic poultry are devastating.

In Europe, over 2 467 outbreaks were reported in poultry in 2021-2022, resulting in the slaughter of 48 million domestic birds in 37 countries. It was the largest bird flu epidemic so far observed on the continent. In Germany alone, 2.3 million birds were destroyed in 2021.

Farmer fears

‘When it affects your flock, the consequences for the farmer are devastating,’ said Wolfgang Schleicher, managing director of ZDG, the central association of the German poultry industry. ‘Not only does it hurt emotionally when a positive infection is detected and you are forced to kill all your birds, but it hurts financially too.’

Until this decade, bird flu was a sporadic visitor to Europe. But now farmers face the constant threat of business disruption. In Germany, one of the EU’s biggest poultry producers, a farmer receives partial compensation for the losses and costs resulting from the culling of birds. But as losses rise, so do insurance premiums.

In addition, the high costs of cleaning and disinfecting barns after an outbreak must be borne primarily by the farmer. And after a cull, farms are prohibited from keeping animals for about 30 days. In short, the price a farm must pay for a bird flu infection is high and pushes the operation to its limits.

‘The fight against avian influenza is at the top of our priorities,’ European Health Commissioner Stella Kyriakides said last month when announcing new EU rules on the vaccination of animals to curb the spread of the disease. ‘These outbreaks are causing enormous damage to this agricultural sector and hamper trade.’

So far, just one vaccine is authorised in the EU against bird flu. The new EU rules, which will enter into force on 12 March, will allow the movement of animals and goods from businesses and zones where vaccination has taken place.

It’s not just farmers who are feeling the pinch. Consumers are noticing increases in the prices of chicken meat and eggs, and sometimes shortages on supermarket shelves.

Then there’s the worry of infection spilling over into the human population. Given the opportunity, the virus could mutate and become more infectious to humans, perhaps even triggering a pandemic.

All of which makes EU scientists intent on finding ways to bring bird flu to heel.

Transmission of the virus happens in two ways – directly with airborne particles of it moving from bird to bird and indirectly through contaminated material such as farm equipment. But until recently, the exact mechanisms of transmission have remained poorly understood.

New knowledge

Professor Thomas Mettenleiter coordinated the EU-funded DELTA-FLU project, which set out to fill in the knowledge gaps. The five-year initiative, which ended in late 2022, brought together experts from Belgium, Germany, Italy, the Netherlands, Sweden, the UK, the US and Hong Kong.

‘Highly pathogenic avian influenza has been a major animal disease for quite some time, but this has been particularly true over the past five years,’ said Mettenleiter, a German virologist.

Previously, migratory birds from Asia spread the virus to domestic birds in a seasonal pattern, with periods of low risk in summer. Infection has now changed from rare, sporadic outbreaks to a situation of continuous risk.

Often, this leads to domestic poultry being culled. If the virus is found in a flock, every bird must be destroyed. And when bird flu is detected in an area, either in wild birds or on commercial premises, birds that would otherwise roam free are routinely ordered to quarantine in barns.

‘But our study has shown that it’s frequently human activity and not direct infection from wild birds that causes new incursions of the virus,’ said Mettenleiter, who is president of the FLI Federal Research Institute for Animal Health in Germany.

People carry the virus into premises on contaminated shoes, clothes, machines, animal feed and bedding, he says.

More care must be taken when handling poultry and biosecurity measures need to be stepped up, according to Mettenleiter. To this end, he and his team have drafted guidelines for higher hygiene standards for personnel working with flocks in lockdown. The hope is that these guidelines will be adopted Europe-wide.

Current wave

While strains of bird flu have probably existed for millennia, the variant that kickstarted the current wave of outbreaks – A(H5N1) – emerged in 1996 in China as a result of the rapid expansion of the commercial duck and poultry sectors. It then spilled over to wild birds and – only rarely – to humans.

This highly contagious variant has now branched off into many sub-variants that occur primarily in commercial poultry and wild water birds.

The virus is classified as either high or low pathogenic (HPAI or LPAI) depending on its genetic characteristics and ability to cause disease and mortality in chickens. Poultry infected with LPAI viruses may show mild signs of the disease or none at all, while HPAI infections can cause severe disease and death.

To complicate matters, LPAI viruses can mutate into other highly pathogenic strains, making it vital for outbreaks to be managed promptly. Both HPAI and LPAI can spread quickly through flocks.

DELTA-FLU unpacked the genetic makeup of the bird flu strains currently prevailing on the continent. Using whole-genome sequencing techniques, the researchers made the surprise discovery that bird flu in Europe is a "swarm incursion" – in other words, there are many variants circulating (more than 15 in Europe).

From this, the researchers demonstrated that variants are blending their genetic material to create new sub-variants. Worryingly, since 2016, some of these mutated viruses have spilled over into other animals, including foxes, minks and seals. Globally, there have been at least 200 recorded cases in mammals.

Encouragingly though, bird flu remains poorly adapted to humans. Infections in humans do occur from time to time, but they are rare and usually happen only after close, prolonged and unprotected (no gloves or other protective wear) contact with infected birds.

Pig link

A bird flu pandemic is unlikely to arise unless the virus first becomes established in an intermediary mammal – most likely a pig. Pig cells have qualities that make it possible for viruses from both birds and humans to take hold and replicate.

'The worry is that one day a pig will act as a mixing vessel, co-hosting flu viruses from both birds and humans,' said Mettenleiter. 'This could result in a novel reassortment – a hybrid virus with genetic material from both viruses.'

Scientific work on more bird flu vaccines for poultry is taking place in parallel with persistent deliberations by governments in Europe about the merits of vaccination to counter the disease.

Vaccinating animals against disease can lead to trade barriers in export markets. That's because of concerns in some importing countries that vaccinated animals can still contract a disease and spread it.

In this context, surveillance remains extremely important, according to Mettenleiter.

Research in this article was funded by the EU. If you liked this article, please consider sharing it on social media.

One Health

The One Health approach builds on the well-established understanding that human health is tightly connected to the well-being of animals and the environment. It advocates close collaboration between the fields of public

health, animal health and food safety to tackle food and animal-borne diseases, antimicrobial resistance and emerging threats.

The EU-funded One Health European Joint Programme is an exemplar of the One Health concept. Since January 2018, it has brought together 44 acclaimed food, veterinary and medical laboratories and institutes across 22 member states in Europe to improve the detect-prevent-response capacity of European countries. The Joint Programme will end in 2023.

The conference “Collaborating to Face Future One Health Challenges in Europe”, which will take place in Brussels on 19-21 June 2023, is an opportunity to reflect on the future of One Health, with a particular focus on Europe.

Register to attend the conference, here.

More info

DELTA-FLU
European Commission on bird flu